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FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant Claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 330.00

Complete if Known	
Application Number	09/711,126
Filing Date	November 13, 2000
First Named Inventor	HILL et al.
Examiner Name	Alvo, Marc S.
Art Unit	1731
Attorney Docket No.	3597-112-01

METHOD OF PAYMENT *(check all that apply)*

☐ Check ☒ Credit card ☐ Money Order ☐ Other ☐ None

☐ Deposit Account

Deposit Account Number: 50-0925

Deposit Account Name: Kilyk & Bowersox, P.L.L.C.

The Director is authorized to: *(check all that apply)*

☐ Charge fee(s) indicated below ☒ Credit any overpayments

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

		Extra Claims		Fee from below		Fee Paid
Total Claims	-20**=		X		=	
Independent Claims	- 3**=		X		=	
Multiple Dependent					=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	**Reissue independent claims over original patent
1205	18	2205	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

** or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge – late filing fee or oath	
1052	50	2052	25	Surcharge – late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	330.00
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive – unavoidable	
1453	1,330	2453	665	Petition to revive – unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	
				Other fee (specify)	

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($)330.00

SUBMITTED BY				Complete *(if applicable)*	
Name *(Print/Type)*	Luke A. Kilyk	Registration No. *(Attorney/Agent)*	33,251	Telephone	540-428-1701
Signature				Date	February 9, 2004

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Stephanie Hill — Stephanie Hill

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Stephanie Hill — Stephanie Hill
Name of Person signing Certificate — Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: HILL et al.	)	Examiner: Alvo, Marc S.
Application Number: 09/711,126	)	Group Art Unit: 1731
Filed: November 13, 2000	)	Confirmation No.: 6456
Docket No.: 3597-112-01	)	Customer No.: 33432

For: PAPER MAKING PROCESSES USING ENZYME AND POLYMER COMBINATIONS

SUBMISSION OF BRIEF ON APPEAL

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

February 9, 2004

Sir:

Submitted herewith are an original and two copies of an Appeal Brief in the above-identified U.S. patent application.

Also enclosed is a Credit Card Payment form in the amount of $330.00 to cover the cost of filing this Appeal Brief. In the event that any additional fees are due with respect to this paper, please charge Deposit Account No. 50-0925. This paper is filed in triplicate.

Respectfully submitted,

Kilyk & Bowersox, P.L.L.C.

Luke A. Kilyk
Reg. No. 33,251

Atty. Docket No. 3597-112-01
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Date: February 9, 2004 Label No. EV369585044US
I hereby certify that, on the date indicated above, I deposited this paper with identified attachments and/or fee with the U.S. Postal Service and that it was addressed for delivery to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 by "Express Mail Post Office to Addressee" service.

Stephanie Hill Stephanie Hill
Name of Person signing Certificate Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: HILL et al.	)	Examiner: Alvo, Marc S.
Application Number: 09/711,126	)	Group Art Unit: 1731
Filed: November 13, 2000	)	Confirmation No.: 6456
Docket No.: 3597-112-01	)	Customer No.: 33432

For: PAPER MAKING PROCESSES USING ENZYME AND POLYMER COMBINATIONS

APPELLANTS' BRIEF ON APPEAL

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

February 9, 2004

Sir:

This is an appeal to the Board of Patent Appeals and Interferences (hereinafter, "the Board") from the Examiner's September 8, 2003 final rejection of claims 1-13, 17-24, 31-39, 41, and 42 in the above-identified application. The appealed claims are set forth in the attached Appendix.

I. THE REAL PARTIES IN INTEREST

The real party in interest, besides the named inventors, is Buckman Laboratories International, Inc.

II. RELATED APPEALS AND INTERFERENCES

No other appeal or interference which would directly affect or be directly affected

by or have a bearing on the Board's decision in this appeal is known to the appellants or the appellants' legal representative.

III. STATUS OF CLAIMS

The claims pending in the application are claims 1-14 and 17-42.

Claims 15 and 16 were canceled without disclaimer or prejudice of the subject matter by the Amendment dated January 7, 2003. Claims 14, 25-30, and 40 were withdrawn due to a restriction requirement dated December 19, 2001. In response to the appellant's Request for Reconsideration filed June 17, 2003, the Examiner issued a final Office Action dated September 8, 2003.

Claims 1-14 and 17-42 are pending. A copy of the claims on appeal can be found in the attached Appendix.

IV. STATUS OF AMENDMENTS

No response was made to the final Office Action dated September 8, 2003, and therefore no amendments were made in response to the final Office Action.

V. SUMMARY OF INVENTION

There is always a continuing effort to improve paper making processes. The disadvantages of the presently used paper making processes include contacting the pulp with the enzyme composition for at least 20 minutes before the pulp can be treated with a conventional synthetic polymeric composition. Such disadvantages are listed, for instance, at page 1, lines 17-19 of the present application. Accordingly, these processes require a separate addition of the synthetic polymer downstream from where the enzyme first contacts the pulp, which is time consuming and complicated. The claimed invention provides a very clever and novel solution to the above problems related to paper making

processes. The claimed invention, in one embodiment, as discussed in detail below and for instance, at page 4, lines 2-8, relates to a method of making paper or paperboard that includes introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other, within 1 minute of each other, or at about the same time, to form a treated pulp. The pulp may also be further treated with at least one cationic starch, as described at page 7, line 13 - page 8, line 3. The resulting pulp is then formed into a sheet of pulp, preferably having improved drainage and/or retention properties compared to conventional treatments.

In another embodiment, as described for instance, at page 10, line 6 – page 11, line 5, a method of making paper or paperboard includes treating pulp in a blend chest with a cationic polymer composition and then passing the treated pulp to a machine chest wherein an enzyme composition is added to the treated pulp. The enzyme-treated pulp is then refined and passed to a stuff box. From the stuff box, the pulp is then passed through a whitewater silo where a second cationic polymer composition is added to the pulp and then the pulp is formed into paper or paperboard. Figures 1-3 of the present application are helpful in visualizing these steps.

VI. ISSUES

The issues remaining for review by the Board of Patent Appeals and Interferences are:

A. The Examiner's rejection of claims 1, 3, 4, 6, 8-11, 13, 17-22, 24, 31-36, 38, 39, 41, and 42 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 (U.S. Patent No. 5,169,497) with or without Sarkar et al. '914 (U.S. Patent No. 5,507,914).

B. The Examiner's rejection of claims 2, 7, 12, and 23 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of EP 433 258.

C. The Examiner's rejection of claims 5 and 37 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of WO 99/43780.

VII. GROUPING OF THE CLAIMS

As presently appealed, the groupings of the claims are as follows:

Claims 1, 3, 4-6, 8-11, 17, 19-22, and 24 stand or fall together;

Claims 2, 7, 12, and 23 stand or fall together;

Claim 13 stands or falls on its own;

Claim 18 stands or falls on its own;

Claims 31-39 stand or fall together; and

Claims 41 and 42 stand or fall together.

VIII. ARGUMENTS

A. The Examiner's rejection of claims 1, 3, 4, 6, 8-11, 13, 17-22, 24, 31-36, 38, 39, 41, and 42 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 (U.S. Patent No. 5,169,497) with or without Sarkar et al. '914 (U.S. Patent No. 5,507,914)

1. The Examiner's Rejection

At page 2 of the final Office Action, the Examiner rejects claims 1, 3, 4, 6, 8-11, 13, 17-22, 24, 31-36, 38, 39, 41, and 42 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914. At pages 2 and 3 of the final Office

Action, the Examiner asserts that Sarkar et al. '497, at col. 3, lines 3-5, describes treating all types of paper pulp with cellulytic enzymes and cationic polymers. The Examiner asserts that Sarkar et al. '497, at Table 1, uses enzyme treatment times of 10 to 60 minutes, which, according to the Examiner, reads on the disclosed "about the same time" which includes adding the two components within 10 minutes of each other. According to the Examiner, Sarkar et al. '497 does not indicate that a cationic polymer should not be added during the enzyme reaction. Thus, the Examiner states that it would have been obvious to add the enzyme and polymer at times shorter than the 10 minutes. According to the Examiner, Sarkar et al. '497 and Sarkar et al. '914 show that both the polymer and the enzyme could be added at multiple additional points throughout the papermaking process.

The Examiner also indicates that Sarkar et al. '497, like Sarkar et al. '914, describes that the enzyme can be added at any chest prior to the refiner and in the machine chest, and that this is the same point where the cationic polymer is added. The Examiner also specifically refers to claims 3 and 5 of Sarkar et al. '914 for a list of equivalent cationic polymers that can be used in the process. The Examiner concludes that it would have been obvious to add different, but equivalent, cationic polymers in each of the multiple feed points taught by Sarkar et al. '914. The Examiner also states that Sarkar et al. '497, at Table 1, shows CSF values of 558.84 for 35 minutes, 439.75 for 60 minutes, and 645.96 for 10 minutes. Thus, the Examiner concludes that CSF values appear to increase for shorter times between addition of the cationic polymer and the enzyme, depending on the other conditions. The Examiner further states that to further improve the CSF value, it would have been obvious, from the data of Table 1, to increase the time between the additions. Additionally, the Examiner states that the appellants have not compared the instant 5

minutes to the 10 minutes described by Sarkar et al. '497.

In response to appellants' arguments that the art does not teach simultaneous addition of the enzyme and the cationic polymer, the Examiner states that the appellants' arguments are not convincing. According to the Examiner, it is proper to take into account not only the specific teachings of the reference, but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. According to the Examiner, based upon the teachings of Sarkar et al. '497, one skilled in the art would not expect the order of adding an enzyme and a polymer to result in producing different products. The Examiner further states that it would have been prima facie obvious to add the two ingredients to the pulp as close together as possible. Furthermore, the Examiner states that it would have been prima facie obvious to select the proper point of addition using routine experimentation. According to the Examiner, the enzyme and the polymer would be expected to act on the pulp. Thus, the Examiner states that one skilled in the art would not expect producing a different result based on the order or timing in which the enzyme and the polymer are added.

In response to the appellants' argument that the Examples of Table I (Runs 30, 3, and 26) use different parameters, the Examiner states that the appellants' argument is not convincing because the claims are not limited to any specific pH or temperature. For the following reasons, the Examiner's rejection should be reversed.

2. The Appellants' Reply to the Examiner's rejection of claims 1, 3, 4, 6, 8-11, 13, 17-22, 24, 31-36, 38, 39, 41, and 42 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 (U.S. Patent No. 5,169,497) with or without Sarkar et al. '914 (U.S. Patent No. 5,507,914).

a) The patentability of claims 1, 3, 4, 6, 8-11, 17, 19-22, and 24.

Claim 1 recites a method of making paper or paperboard by introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other to form a treated pulp, and forming the treated pulp into paper or paperboard.

Claim 3 is dependent on claim 1, and recites that the cellulytic enzyme composition contains from about 5% to about 20% by weight enzyme.

Claim 4 is dependent on claim 1, and recites that the cellulytic enzyme composition is added to the pulp in an amount of from about 0.100% to about 0.001% by weight enzyme based on the dry weight of the pulp.

Claim 6 is dependent on claim 1, and recites that the pulp includes a sulphite pulp.

Claim 8 is dependent on claim 1, and recites that at least one cationic polymer composition includes a synthetic cationic polymer.

Claim 9 is dependent on claim 1, and recites that the cationic polymer composition includes a polyacrylamide polymer.

Claim 10 is dependent on claim 1, and recites that at least one cationic polymer composition is a synthetic, water-soluble cationic polymer containing acrylamide units and cationic monomeric units.

Claim 11 is dependent on claim 1, and recites that the cationic polymer in the cationic polymer composition is added to the pulp in an amount of from about 0.0001% by weight to about 1.000% by weight, based on the dried solids weight of the pulp.

Claim 17 is dependent on claim 1, and recites that at least one cellulytic enzyme composition and at least one cationic polymer composition are added within 1 minute of each other.

Claims 19 and 20 are dependent on claims 1 and 19, respectively, and recite that at least one cellulytic enzyme composition and at least one cationic polymer composition are added prior to a blend chest and a first refiner, respectively, in a paper making process.

Claim 21 is dependent on claim 19, and further recites introducing at least one first cationic starch to the treated pulp prior to the blend chest.

Claim 22 is dependent on claim 19, and recites that at least one cationic polymer composition includes a synthetic polymer having at least one nitrogen-containing polymer.

Claim 24 is dependent on claim 1, and recites that the pulp is a virgin sulfite pulp.

With respect to the merits of the rejection, a method of making paper or paperboard by introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other to form a treated pulp, as set forth in the claimed invention is not taught or suggested by Sarkar et al. '497 and/or Sarkar et al. '914.

Sarkar et al. '497 is directed to improving freeness of paper pulp that includes adding to the pulp a cellulytic enzyme, and allowing the pulp to contact the cellulytic enzyme for at least 20 minutes. See col. 3, line 25. According to Sarkar et al. '497, at col. 3, the process requires that the pulp first be treated with an enzyme and then with a cationic polymer. Furthermore, Sarkar et al. '497, at col. 3, lines 25 and 26, indicates that the minimum treating time of the pulp with an enzyme is about 20 minutes. In fact, Sarkar et al. '497 states, at col. 3, lines 19-22, "[i]t is also important to the successful practice of the invention, that the conditions under which the treatment with the enzyme

occurs is such to provide optimum reaction time of the enzyme with the pulp." Clearly, for the invention of Sarkar et al. '497 to succeed, a reaction time of 20 minutes is necessary. Accordingly, one skilled in the art by reading Sarkar et al. '497 would conclude that a reaction time of less than 20 minutes will not make the invention "successful."

According to Sarkar et al. '497, at Table 1, the CSF (Canadian Standard Freeness) values vary depending on the enzyme treatment time. CSF value is a designated value which relates to the freeness of the pulp, the rate at which water will drain through the pulp. The drainability of the pulp is a significant for predicting the draining capability of the pulps in an aqueous suspension. A low freeness means that the paper machine will have to operate relatively slowly, a condition that is usually intolerable. Thus, the higher the CSF value, the higher the draining capability of the pulps in an aqueous suspension. Thus, Sarkar et al. '497 clearly mandates that there be a waiting time of at least 20 minutes between the introduction of the cationic polymer and after the introduction of the enzyme. At least 20 minutes is not "within 5 minutes." At least 20 minutes is at least 4 times greater in value than within 5 minutes. As such, one skilled in the art would not conclude that at least 20 minutes would render 5 minutes or less obvious.

As the Examiner admits, each Sarkar et al. reference shows a delay in the treating time with the enzyme cationic polymer. In fact, the Examiner at page 3, lines 19-21 of the final Office Action, states that according to Table 1 of Sarkar et al. '497, an increase in time between the additions further improves the CSF value. Since 20 minutes is not "within 5 minutes" and is not even close to "within 5 minutes," it is clear that Sarkar et al. does not teach or suggest the claimed invention. Furthermore, claim 17, which recites a

time of within 1 minute, is also different from the Examiner's interpretation of Sakar et al. Accordingly, it is clear that the Sarkar et al. patents do not teach or suggest the claimed invention.

With respect to the Examiner's reliance on Table 1 of Sarkar et al. '497, Table 1 does make references to 10 minutes. However, even "10 minutes" is not the same as "within 5 minutes." It is double the time. In fact, one skilled in the art by reading Table 1 would appreciate that a reduced reaction time results in an undesirable lower Canadian standard freeness (CSF) value.

According to Table 1, at col. 4, lines 39, 40, and 43 (Runs 21, 15, and 20, respectively) polymer 2 with enzyme 1 at a pH of 6, at 40°C, and at a reaction time of 10 minutes, results in a CSF value of 506.63 (see Run 21); however, the same composition at the same temperature, but at a reaction time of 35 minutes, results in a CSF value of 601.0, and at a reaction time of 85 minutes, results in a CSF value of 622.60 (see Runs 20 and 15, respectively). Higher CSF values as explained above are better. Therefore, one skilled in the art by reading each of the Sarkar et al. references, and especially in view of Table 1 of Sarkar et al. '497, would conclude that a reaction time of greater than 20 minutes is required and that a reaction time of less than 10 minutes would result in a poor reaction. As such, Sarkar et al. clearly teaches away from introducing the enzyme composition and the cationic polymer composition at less than 20 minutes of each other, and certainly based on the poor CSF results, one skilled in the art would clearly not go below 10 minutes.

With respect to the Examiner's statement that Sarkar et al. '497, at Table 1, describes CSF values of 558.84 for 35 minutes (Run 30), 439.75 for 60 minutes (Run 3),

and 645.96 for 10 minutes (Run 26), and that one skilled in the art by reading Sarkar et al. '497 would conclude that the CSF values appear to increase with shorter time durations between the introduction of the cationic polymer and the introduction of the enzyme, the Examiner's conclusion is simply incorrect. The Examiner is making an unfair comparison as explained below.

It is a well known fact that in order to determine the effect of changing a variable, such as a treatment time, all other variables must be kept constant. To determine how a treatment time of 10 minutes versus a treatment time of 35 minutes and a treatment time of 85 minutes effect the CSF value, the remaining parameters/variables, such as the composition and the environment must be kept constant in all comparative runs. Keeping the remaining parameters/variables (e.g., the type of polymer, the amount of enzyme, the pH level of the composition, and the temperature) constant while changing the treatment time ensures that parameters/variables other than the treatment time have not influenced or affected the CSF value.

Given that each of Runs 30, 3, and 26 in Table 1 of Sarkar et al. '497, include a different polymer, enzyme, pH, and temperature, it would be impossible, for one skilled in the art, to determine which of the variables, or a combination thereof, caused the change/discrepancy between the CSF value of each of Runs 30, 3, and 26.

The Board should recognize and appreciate that since the parameters of Runs 30, 3, and 26 differ from each other, the CSF value obtained from each of those Runs cannot properly be compared to one another to determine the effect of changing the treatment time. For example, the parameters of Run 30 include polymer 2, pH of 6, enzyme concentration of 0.1, and temperature of 70°C. However, the parameters of Run 3 include

polymer 1, pH of 7.07, enzyme concentration of 0.2, and temperature of 25°C. Additionally, the parameters of Run 26 include polymer 3, pH of 4.6, enzyme concentration of 0.2, and temperature of 55°C. These are drastically different parameters for each run. Therefore, one skilled in the art would not be able to determine which one of these parameters contributed to the value of the CSF in each Run. Thus, it would be unreasonable to ignore the effect of these parameters and conclude that the difference between the CSF value in each Run is exclusively related to the treatment time.

Accordingly, the Examiner's conclusion that CSF values appear to increase with shorter time duration between the introduction of the cationic polymer and the introduction of the enzyme is not supported in Sarkar et al. '497.

In contrast, since the parameters of Runs 15, 20 and 21 in Table 1 of Sarkar et al. '497, include the same polymer (2), the same enzyme concentration (0.1), the same pH level (6), and the same temperature (40°C), one skilled in the art can compare each of the CSF values of Runs 15, 20 and 21 to determine the effect of the treatment time. According to Table 1, a reaction time of 10 minutes (Run 21) results in a CSF value of 506.63. However, the same composition at the same temperature, but at a different reaction time of 35 minutes (Run 20) results in an improved CSF value of 601.0, and at a reaction time of 85 minutes (Run 15) results in yet higher CSF value of 622.60. As time increases, the properties are better. Accordingly, one skilled in the art, by reading Sarkar et al. '497, would conclude that a reaction time of greater than 20 minutes is required, and that a reaction time of less than 10 minutes would not be satisfactory. As such, Sarkar et al. '497 clearly teaches away from reacting a polymer composition with a paper making pulp for a time less than 20 minutes and certainly based on the poor results

illustrated at Table 1, one skilled in the art would clearly not be motivated to react a polymer composition with a paper making pulp for a time less than 10 minutes.

With respect to Sarkar et al. '914, this patent is very similar to Sarkar et al. '497 in that the purpose of the invention is to enhance the freeness of paper pulp. Sarkar et al. '914 further requires long delays between the introduction of the enzyme and the introduction of any cationic polymer. Therefore, for the same reasons discussed above with respect to Sarkar et al. '497, Sarkar et al. '914 does not teach or suggest the claimed invention.

With respect to claim 22 which recites that the polymeric composition includes a synthetic polymer having at least one nitrogen-containing polymer, no mention of utilizing a nitrogen-containing polymer is made in Sarkar et al. '497 and Sarkar et al. '914.

Accordingly, for the reasons set forth above, the rejection of claims 1, 3, 4, 6, 8-11, 17, 19-22, and 24 should be reversed.

b) The patentability of claim 13.

Claim 13 is dependent on claim 1, and recites that the cationic polymer in the cationic polymer composition has a weight average molecular weight of at least about 10,000 and a cationic polymer composition is pre-combined with the enzyme composition before the polymer and enzyme are added together to the pulp.

The arguments set forth above with respect to the patentability of claim 1 apply equally here, and are incorporated in their entirety by reference herein.

As noted, claim 13 specifically relates to a polymer that includes a weight average molecular weight of at least about 10,000 and the cationic polymer composition is pre-

combined with the enzyme composition.

Besides the above previously presented arguments, Sarkar et al. '497, with or without Sarkar et al. '914, does not teach or suggest pre-combining a cationic polymer and an enzyme as recited in claim 13 of the present application. Instead, col. 3 of Sarkar et al. '497 requires that the pulp first be treated with the enzyme and then with a cationic polymer. Similarly, Sarkar et al. '914, at col. 3, lines 24-28, state that its invention requires that the pulp first be treated with an enzyme at two distinct and separate locations in the paper making process, then with a cationic polymer, and finally, with an anionic polymer. Thus, Sarkar et al. '497, with or without Sarkar et al. '914, does not teach or suggest pre-combining a cationic polymer composition with an enzyme composition prior to adding the polymer and enzyme to the pulp.

Accordingly, for the reasons set forth above, the rejection of claim 13 should be reversed.

c) The patentability of claim 18.

Claim 18 is dependent on claim 1, and recites that at least one cellulytic enzyme composition and at least one cationic polymer composition are added simultaneously.

The arguments set forth above with respect to the patentability of claim 1 apply equally here, and are incorporated in their entirety by reference herein. Furthermore, Sarkar et al. '497, at col. 3, lines 17-19, states that its invention requires that the pulp first be treated with the enzyme and then with the cationic polymer. Furthermore, Sarkar et al. '914, at col. 3, lines 24-27, state that its invention requires that the pulp first be treated with an enzyme at two distinct and separate points in the paper making process, then with a cationic polymer and, finally, with an anionic polymer. Sarkar et al. '497, with or

without Sarkar et al. '914, does not teach or suggest adding at least one cellulytic enzyme composition and at least one cationic polymer composition simultaneously to the pulp.

Accordingly, for the reasons set forth above, the rejection of claim 18 should be reversed.

d) The patentability of claims 31-36, 38, and 39.

Claim 31 recites a method of making paper or paperboard by introducing a cationic polymer composition to a pulp to form treated pulp; introducing at least one cellulytic enzyme composition to said treated pulp to form an enzyme-treated pulp; adding a nitrogen-containing cationic polymer composition to the enzyme-treated pulp; and forming the pulp into paper or paperboard.

Claim 32 is dependent on claim 31, and further recites introducing a second cationic polymer composition to the enzyme-treated pulp prior to introducing the nitrogen-containing cationic polymer composition to the enzyme-treated pulp.

Claim 33 is dependent on claim 31, and recites that the cationic polymer composition includes a nitrogen-containing polymer or a starch.

Claim 34 is dependent on claim 32, and recites that the second cationic polymer composition includes a nitrogen-containing polymer or a starch.

Claim 35 is dependent on claim 31, and recites that the cellulytic enzyme composition contains from about 5% to about 20% enzyme.

Claim 36 is dependent on claim 31, and recites that the enzyme in the enzyme composition is added to the pulp in an amount of from about 0.001% to about 0.100% by weight enzyme based on the dried solids weight of the pulp.

Claim 38, is dependent on claim 31, and recites that the pulp includes a sulfite

pulp.

Claim 39 is dependent on claim 31, and recites that the cationic polymer in the cationic polymer composition is added to the pulp in an amount of from about 0.0001% by weight to about 1.000% by weight, based on the dried solids weight of the pulp.

Sarkar et al. '497 does not teach or suggest first introducing a cationic polymer composition to the pulp to form a treated pulp and then introducing at least one cellulytic enzyme to the treated pulp to form the pulp into paper, as recited in claim 31 of the present application. Claim 31 recites this order. Instead, Sarkar et al. '497, at col. 3, requires that the pulp first be treated with the enzyme, for a minimum treating time of about 20 minutes, and then with the cationic polymer. Clearly the order of adding the enzyme and the cationic polymer taught by Sarkar et al. '497 teaches away from first introducing a cationic polymer composition to the pulp, to form a treated pulp, and then adding at least one cellulytic enzyme composition to the treated pulp, as recited in claim 31 of the present application. Thus, for the reasons set forth above, Sarkar et al. '497 clearly teaches away from claim 31 and the claims dependent thereon.

Furthermore, no mention is made in Sarkar et al. '497 or Sarkar et al. '914 of using a nitrogen-containing polymer or a starch, as recited in claims 33 and 34 of the present application. Accordingly, for the reasons set forth above, the rejection of claims 31-36, 38, and 39 should be reversed.

e) The patentability of claims 41 and 42.

Claim 41 is dependent on claim 31, and recites that a cationic polymer composition is introduced at the blend chest in a paper making process and at least one cellulytic enzyme composition is introduced at the machine chest of the same paper making process and the

nitrogen-containing cationic polymer composition is added at about the whitewater silo in the same paper making process.

Claim 42 is dependent on claim 41, and recites that the optional cationic polymer is introduced at the stuff box which is located between the machine chest and the whitewater silo.

The arguments set forth above with respect to the patentability of claim 31 apply equally here, and are incorporated in their entirety by reference herein. As stated earlier, the invention of Sarkar et al. '497 requires that the pulp first be treated with the enzyme and then with a cationic polymer. Additionally, Sarkar et al. '497, at col. 3, lines 48-51, states that a typical enzyme addition point in the paper making system would be the machine chest. Given that, according to the figures of the present invention, the machine chest is located after the blend chest, and Sarkar et al. '497, at col. 3, lines 15-19, specifically states that the pulp is first treated with the enzyme and then with a cationic polymer, Sarkar et al. '497 teaches away from introducing the cationic polymer composition in the blend chest.

Sarkar et al. '914 describes the use of multiple feed points for the polymer and the enzyme. Sarkar et al. '914 also requires that the pulp first be treated with an enzyme and then with a cationic polymer (see col. 3, lines 24-28). Given that the blend chest, wherein the polymer composition as recited in claim 31 is introduced, is located prior to the machine chest, and Sarkar et al. '497 and Sarkar et al. '914 require the pulp to first be treated with the enzyme at the machine chest and then with the cationic polymer, Sarkar et al. '497 and '914 teach away from claim 41 of the present application, which introduces the polymer in a blend chest located prior to the machine chest. Furthermore, none of the references teach or suggest a nitrogen-containing cationic polymer composition that is added at about the

whitewater silo in the paper making process. Accordingly, for the reasons set forth above, the rejection of claims 41 and 42 should be reversed.

B. The Examiner's rejection of claims 2, 7, 12, and 23 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of EP 433 258.

1. The Examiner's Rejection

At page 4 of the final Office Action, the Examiner rejects claims 2, 7, 12, and 23 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of EP 433 258. The Examiner asserts that EP 433 258 teaches that adding cationic starch to paper pulp during enzymatic treatment increases the strength of the paper. Therefore, according to the Examiner, it would have been obvious to add the cationic starch to the pulp of Sarkar et al. '497 to increase the paper strength as taught by EP 433 258. The Examiner also asserts that it would have been obvious to add the starch at various addition points in the same manner as the cationic starch and the enzyme in Sarkar et al. '914.

The Examiner also asserts that the appellants' arguments with respect to the addition of starch is not convincing because the appellants failed to show the criticality of adding a starch at a certain time. The Examiner states that it is known that starch increases the strength of paper. Furthermore, the Examiner states that the ingredients of the reference would have been expected to form the same final mixture as the claimed invention, irrespective as to the order of addition. Thus, the Examiner states that it is proper to take into account not only the specific teachings of the reference, but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. For the following

reasons, the Examiner's rejection should be reversed.

2. The Appellants' Reply to the Examiner's Rejection of claims 2, 7, 12, and 23 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of EP 433 258.

a) The patentability of claims 2, 7, 12, and 23.

Claim 2 is dependent on claim 1, and further recites introducing at least one first cationic starch to the treated pulp.

Claim 7 is dependent on claim 2, and recites a second cationic starch, which is the same or different from the first cationic starch, and is introduced to the treated pulp before forming the treated pulp into paper or paperboard.

Claim 12 is dependent on claim 2, and recites that at least one cationic starch is added to the treated pulp in an amount of from about 5 to about 25 pounds per ton based on the dried solids weight of the pulp.

Claim 23 is dependent on claim 21, and further recites introducing at least a second cationic starch to the treated pulp and wherein the first and second cationic starches are the same or different.

With respect to the merits of the rejection, a method of making paper or paperboard by introducing at least one first cationic starch to the treated pulp is not taught by Sarkar et al. '497, with or without Sarkar et al. '914, and further in view of EP 433 258.

The arguments set forth above with respect to the patentability of claim 1 apply equally here, and are incorporated in their entirety by reference herein. As previously stated, Sarkar et al. '497, with or without Sarkar et al. '914, does not teach or suggest introducing at least one cellulytic enzyme and at least one cationic polymer composition to a paper making

pulp within 5 minutes of each other.

In addition, the Examiner has not explained how one skilled in the art could easily adapt the particular teachings set forth in EP 433 258 into either one of the Sarkar et al. patents. Sarkar et al., in each patent, clearly requires a long delay time between the introduction of enzyme and the cationic polymer. Thus, any introduction of a cationic starch as shown in EP 433 258 would require even a longer delay if used in Sarkar et al.

According to Sarkar et al. '497, the order of adding the ingredients is extremely important. According to Sarkar et al. '497, the cationic polymer prevents the enzyme from properly reacting with the pulp. Thus, because of the order in which the ingredients are added in the reference, one skilled in the art would not expect the ingredients of the reference to form the final mixture of the claimed invention.

With respect to the Examiner's argument that it is obvious to add starch at various addition points, the Examiner provides no support for this conclusion. In addition, EP 433 258 clearly indicates that the starch is added prior to the enzyme. This is the complete opposite to the teachings of the Sarkar et al. patents and thus would not make sense if the teaching of EP 433 258 were applied to Sarkar et al. Accordingly, the combination of EP 433 258 with Sarkar et al. '497, with or without Sarkar et al. '914, is not possible.

Moreover, the Examiner's "inference" standard is not the standard to use for determining patentability under 35 U.S.C. §103.

Accordingly, for the reasons set forth above, the rejection of claims 2, 7, 12, and 23 should be reversed.

C. The Examiner's rejection of claims 5 and 37 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further

in view of WO 99/43780.

1. The Examiner's Rejection

At page 4 of the final Office Action, the Examiner rejects claims 5 and 37 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of WO 99/43780. The Examiner asserts that WO 99/43780 describes stabilizing the enzymes during pulp treatment by using the enzyme in combination with a polyamide oligomer. Therefore, the Examiner asserts that it would have been obvious to add the polyamide oligomer of WO 99/43780 to stabilize the enzyme of Sarkar et al. '497. For the following reasons, the Examiner's rejection of claims 5 and 37 should be reversed.

2. The Appellants' Reply to the Examiner's rejection of claims 5 and 37 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of WO 99/43780.

a) The patentability of claim 5.

Claim 5 is dependent on claim 1, and recites that the cellulytic enzyme composition includes at least one polyamide oligomer and at least one cellulytic enzyme.

The arguments set forth above with respect to the patentability of claim 1 apply equally here, and are incorporated in their entirety by reference herein. As previously stated, neither Sarkar et al. '497, Sarkar et al. '914, nor a combination thereof teaches or suggests introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other to make paper or paperboard.

WO 99/43780 relates to improving the shelf life stability of enzymes by using

polyamide oligomers. WO 99/43780 does not cure any of the deficiencies of Sarkar et al. '497 or Sarkar et al. '914. Accordingly, for the reasons set forth above, the rejection of claim 5 should be reversed.

b) The patentability of claim 37.

Claim 37 is dependent on claim 31, and recites that the enzyme composition includes at least one polyamide oligomer and at least one cellulytic enzyme.

The arguments set forth above with respect to the patentability of claim 31 apply equally here, and are incorporated in their entirety by reference herein. As previously stated, Sarkar et al. '497 and Sarkar et al. '914, do not teach or suggest first introducing a cationic polymer composition to the pulp and then introducing at least one cellulytic enzyme to form the paper pulp into paper. Additionally, Sarkar et al. '497 and Sarkar et al. '914 do not teach or suggest adding a nitrogen-containing cationic polymer composition to the enzyme-treated pulp.

As stated above, WO 99/43780 relates to improving the shelf life stability of enzymes by using polyamide oligomers. However, the reference does not cure any of the deficiencies of Sarkar et al. '497 or Sarkar et al. '914. Accordingly, for the reasons set forth above, the rejection of claim 37 should be reversed.

IX. CONCLUSION

For at least the reasons discussed above, it is respectfully submitted that the Examiner's rejection of all the pending claims is in error and should be reversed.

If there is any fee due in connection with the filing of this Brief on Appeal, please

charge the fee to our Deposit Account No. 50-0925.

Respectfully submitted,

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APPENDIX

1. A method of making paper or paperboard comprising:

a) introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other to form a treated pulp; and

b) forming the treated pulp into paper or paperboard.

2. The method of claim 1, further comprising introducing at least one first cationic starch to the treated pulp.

3. The method of claim 1, wherein said cellulytic enzyme composition contains from about 5 % to about 20 % by weight enzyme.

4. The method of claim 1, wherein said cellulytic enzyme composition is added to said pulp in an amount of from about 0.100% to about 0.001% by weight enzyme based on the dry weight of the pulp.

5. The method of claim 1, wherein said cellulytic enzyme composition comprises at least one polyamide oligomer and at least one cellulytic enzyme.

6. The method of claim 1, wherein said pulp comprises a sulphite pulp.

7. The method of claim 2, wherein a second cationic starch, which is the same or different from the first cationic starch, is introduced to the treated pulp before step b).

8. The method of claim 1, wherein said at least one cationic polymer composition comprises a synthetic cationic polymer.

9. The method of claim 1, wherein said at least one cationic polymer composition comprises a polyacrylamide polymer.

10. The method of claim 1, wherein said at least one cationic polymer composition is a synthetic, water-soluble cationic polymer containing acrylamide units and cationic monomeric units.

11. The method of claim 1, wherein cationic polymer in said cationic polymer composition is added to said pulp in an amount of from about 0.0001% by weight to about 1.000% by weight, based on the dried solids weight of said pulp.

12. The method of claim 2, wherein said at least one cationic starch is added to said treated pulp in an amount of from about 5 to about 25 pounds per ton based on the dried solids weight of the pulp.

13. The method of claim 1, wherein cationic polymer in said cationic polymer composition has a weight average molecular weight of at least about 10,000 and said cationic polymer composition is pre-combined with the enzyme composition before the polymer and enzyme are added together to the pulp.

17. The method of claim 1, wherein said at least one cellulytic enzyme composition and at least one cationic polymer composition are added within 1 minute of each other.

18. The method of claim 1, wherein said at least one cellulytic enzyme composition and at least one cationic polymer composition are added simultaneously.

19. The method of claim 1, wherein said at least one cellulytic enzyme composition and at least one cationic polymer composition are added prior to a blend chest in a paper making process.

20. The method of claim 19, wherein said at least one cellulytic enzyme composition and at least one cationic polymer composition are added prior to a first refiner which is located before the blend chest.

21. The method of claim 19, further comprising introducing at least one first cationic starch to the treated pulp prior to the blend chest.

22. The method of claim 19, wherein said at least one cationic polymer composition comprises a synthetic polymer having at least one nitrogen-containing polymer.

23. The method of claim 21, further comprising introducing at least a second cationic starch to the treated pulp and wherein said first and second cationic starches are the same or different.

24. The method of claim 1, wherein said pulp is a virgin sulfite pulp.

31. A method of making paper or paperboard comprising:

a) introducing a cationic polymer composition to a pulp to form treated pulp;

b) introducing at least one cellulytic enzyme composition to said treated pulp to form an enzyme-treated pulp;

c) adding a nitrogen-containing cationic polymer composition to the enzyme-treated pulp; and

d) forming the pulp into paper or paperboard.

32. The method of claim 31, further comprising introducing a second cationic polymer composition to the enzyme-treated pulp prior to introducing the nitrogen-containing cationic polymer composition to the enzyme-treated pulp.

33. The method of clam 31, wherein said cationic polymer composition comprises a nitrogen-containing polymer or a starch.

34. The method of claim 32, wherein said second cationic polymer composition comprises a nitrogen-containing polymer or a starch.

35. The method of claim 31, wherein said cellulytic enzyme composition contains from about 5% to about 20% enzyme.

36. The method of claim 31, wherein said enzyme in said enzyme composition is added to said pulp in an amount of from about 0.001% to about 0.100% by weight enzyme based on the dried solids weight of the pulp.

37. The method of claim 31, wherein said enzyme composition comprises at least one polyamide oligomer and at least one cellulytic enzyme.

38. The method of claim 31, wherein said pulp comprises a sulfite pulp.

39. The method of claim 31, wherein said cationic polymer in said cationic polymer composition is added to said pulp in an amount of from about 0.0001% by weight to about 1.000% by weight, based on the dried solids weight of said pulp.

41. The method of claim 31, wherein said cationic polymer composition is introduced at the blend chest in a paper making process and said at least one cellulytic enzyme composition is introduced at the machine chest of the same paper making process and said nitrogen-containing cationic polymer composition is added at about the whitewater silo in the same paper making process.

42. The method of claim 41, wherein said optional cationic polymer is introduced at the stuff box which is located between said machine chest and said whitewater silo.

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Stephanie Hill Stephanie Hill
Name of Person signing Certificate Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: HILL et al.	)	Examiner: Alvo, Marc S.
Application Number: 09/711,126	)	Group Art Unit: 1731
Filed: November 13, 2000	)	Confirmation No.: 6456
Docket No.: 3597-112-01	)	Customer No.: 33432

For: PAPER MAKING PROCESSES USING ENZYME AND POLYMER COMBINATIONS

SUBMISSION OF BRIEF ON APPEAL

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

February 9, 2004

Sir:

Submitted herewith are an original and two copies of an Appeal Brief in the above-identified U.S. patent application.

Also enclosed is a Credit Card Payment form in the amount of $330.00 to cover the cost of filing this Appeal Brief. In the event that any additional fees are due with respect to this paper, please charge Deposit Account No. 50-0925. This paper is filed in triplicate.

Respectfully submitted,

Kilyk & Bowersox, P.L.L.C.

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Date: February 9, 2004 Label No. EV369585044US
I hereby certify that, on the date indicated above, I deposited this paper with identified attachments and/or fee with the U.S. Postal Service and that it was addressed for delivery to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 by "Express Mail Post Office to Addressee" service.

Stephanie Hill _____
Name of Person signing Certificate Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
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For: PAPER MAKING PROCESSES USING ENZYME AND POLYMER COMBINATIONS

APPELLANTS' BRIEF ON APPEAL

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

February 9, 2004

Sir:

This is an appeal to the Board of Patent Appeals and Interferences (hereinafter, "the Board") from the Examiner's September 8, 2003 final rejection of claims 1-13, 17-24, 31-39, 41, and 42 in the above-identified application. The appealed claims are set forth in the attached Appendix.

I. THE REAL PARTIES IN INTEREST

The real party in interest, besides the named inventors, is Buckman Laboratories International, Inc.

II. RELATED APPEALS AND INTERFERENCES

No other appeal or interference which would directly affect or be directly affected

by or have a bearing on the Board's decision in this appeal is known to the appellants or the appellants' legal representative.

III. STATUS OF CLAIMS

The claims pending in the application are claims 1-14 and 17-42.

Claims 15 and 16 were canceled without disclaimer or prejudice of the subject matter by the Amendment dated January 7, 2003. Claims 14, 25-30, and 40 were withdrawn due to a restriction requirement dated December 19, 2001. In response to the appellant's Request for Reconsideration filed June 17, 2003, the Examiner issued a final Office Action dated September 8, 2003.

Claims 1-14 and 17-42 are pending. A copy of the claims on appeal can be found in the attached Appendix.

IV. STATUS OF AMENDMENTS

No response was made to the final Office Action dated September 8, 2003, and therefore no amendments were made in response to the final Office Action.

V. SUMMARY OF INVENTION

There is always a continuing effort to improve paper making processes. The disadvantages of the presently used paper making processes include contacting the pulp with the enzyme composition for at least 20 minutes before the pulp can be treated with a conventional synthetic polymeric composition. Such disadvantages are listed, for instance, at page 1, lines 17-19 of the present application. Accordingly, these processes require a separate addition of the synthetic polymer downstream from where the enzyme first contacts the pulp, which is time consuming and complicated. The claimed invention provides a very clever and novel solution to the above problems related to paper making

processes. The claimed invention, in one embodiment, as discussed in detail below and for instance, at page 4, lines 2-8, relates to a method of making paper or paperboard that includes introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other, within 1 minute of each other, or at about the same time, to form a treated pulp. The pulp may also be further treated with at least one cationic starch, as described at page 7, line 13 - page 8, line 3. The resulting pulp is then formed into a sheet of pulp, preferably having improved drainage and/or retention properties compared to conventional treatments.

In another embodiment, as described for instance, at page 10, line 6 – page 11, line 5, a method of making paper or paperboard includes treating pulp in a blend chest with a cationic polymer composition and then passing the treated pulp to a machine chest wherein an enzyme composition is added to the treated pulp. The enzyme-treated pulp is then refined and passed to a stuff box. From the stuff box, the pulp is then passed through a whitewater silo where a second cationic polymer composition is added to the pulp and then the pulp is formed into paper or paperboard. Figures 1-3 of the present application are helpful in visualizing these steps.

VI. ISSUES

The issues remaining for review by the Board of Patent Appeals and Interferences are:

A. The Examiner's rejection of claims 1, 3, 4, 6, 8-11, 13, 17-22, 24, 31-36, 38, 39, 41, and 42 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 (U.S. Patent No. 5,169,497) with or without Sarkar et al. '914 (U.S. Patent No. 5,507,914).

B. The Examiner's rejection of claims 2, 7, 12, and 23 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of EP 433 258.

C. The Examiner's rejection of claims 5 and 37 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of WO 99/43780.

VII. GROUPING OF THE CLAIMS

As presently appealed, the groupings of the claims are as follows:

Claims 1, 3, 4-6, 8-11, 17, 19-22, and 24 stand or fall together;

Claims 2, 7, 12, and 23 stand or fall together;

Claim 13 stands or falls on its own;

Claim 18 stands or falls on its own;

Claims 31-39 stand or fall together; and

Claims 41 and 42 stand or fall together.

VIII. ARGUMENTS

A. The Examiner's rejection of claims 1, 3, 4, 6, 8-11, 13, 17-22, 24, 31-36, 38, 39, 41, and 42 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 (U.S. Patent No. 5,169,497) with or without Sarkar et al. '914 (U.S. Patent No. 5,507,914)

1. The Examiner's Rejection

At page 2 of the final Office Action, the Examiner rejects claims 1, 3, 4, 6, 8-11, 13, 17-22, 24, 31-36, 38, 39, 41, and 42 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914. At pages 2 and 3 of the final Office

Action, the Examiner asserts that Sarkar et al. '497, at col. 3, lines 3-5, describes treating all types of paper pulp with cellulytic enzymes and cationic polymers. The Examiner asserts that Sarkar et al. '497, at Table 1, uses enzyme treatment times of 10 to 60 minutes, which, according to the Examiner, reads on the disclosed "about the same time" which includes adding the two components within 10 minutes of each other. According to the Examiner, Sarkar et al. '497 does not indicate that a cationic polymer should not be added during the enzyme reaction. Thus, the Examiner states that it would have been obvious to add the enzyme and polymer at times shorter than the 10 minutes. According to the Examiner, Sarkar et al. '497 and Sarkar et al. '914 show that both the polymer and the enzyme could be added at multiple additional points throughout the papermaking process.

The Examiner also indicates that Sarkar et al. '497, like Sarkar et al. '914, describes that the enzyme can be added at any chest prior to the refiner and in the machine chest, and that this is the same point where the cationic polymer is added. The Examiner also specifically refers to claims 3 and 5 of Sarkar et al. '914 for a list of equivalent cationic polymers that can be used in the process. The Examiner concludes that it would have been obvious to add different, but equivalent, cationic polymers in each of the multiple feed points taught by Sarkar et al. '914. The Examiner also states that Sarkar et al. '497, at Table 1, shows CSF values of 558.84 for 35 minutes, 439.75 for 60 minutes, and 645.96 for 10 minutes. Thus, the Examiner concludes that CSF values appear to increase for shorter times between addition of the cationic polymer and the enzyme, depending on the other conditions. The Examiner further states that to further improve the CSF value, it would have been obvious, from the data of Table 1, to increase the time between the additions. Additionally, the Examiner states that the appellants have not compared the instant 5

minutes to the 10 minutes described by Sarkar et al. '497.

In response to appellants' arguments that the art does not teach simultaneous addition of the enzyme and the cationic polymer, the Examiner states that the appellants' arguments are not convincing. According to the Examiner, it is proper to take into account not only the specific teachings of the reference, but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. According to the Examiner, based upon the teachings of Sarkar et al. '497, one skilled in the art would not expect the order of adding an enzyme and a polymer to result in producing different products. The Examiner further states that it would have been prima facie obvious to add the two ingredients to the pulp as close together as possible. Furthermore, the Examiner states that it would have been prima facie obvious to select the proper point of addition using routine experimentation. According to the Examiner, the enzyme and the polymer would be expected to act on the pulp. Thus, the Examiner states that one skilled in the art would not expect producing a different result based on the order or timing in which the enzyme and the polymer are added.

In response to the appellants' argument that the Examples of Table I (Runs 30, 3, and 26) use different parameters, the Examiner states that the appellants' argument is not convincing because the claims are not limited to any specific pH or temperature. For the following reasons, the Examiner's rejection should be reversed.

2. The Appellants' Reply to the Examiner's rejection of claims 1, 3, 4, 6, 8-11, 13, 17-22, 24, 31-36, 38, 39, 41, and 42 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 (U.S. Patent No. 5,169,497) with or without Sarkar et al. '914 (U.S. Patent No. 5,507,914).

a) The patentability of claims 1, 3, 4, 6, 8-11, 17, 19-22, and 24.

Claim 1 recites a method of making paper or paperboard by introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other to form a treated pulp, and forming the treated pulp into paper or paperboard.

Claim 3 is dependent on claim 1, and recites that the cellulytic enzyme composition contains from about 5% to about 20% by weight enzyme.

Claim 4 is dependent on claim 1, and recites that the cellulytic enzyme composition is added to the pulp in an amount of from about 0.100% to about 0.001% by weight enzyme based on the dry weight of the pulp.

Claim 6 is dependent on claim 1, and recites that the pulp includes a sulphite pulp.

Claim 8 is dependent on claim 1, and recites that at least one cationic polymer composition includes a synthetic cationic polymer.

Claim 9 is dependent on claim 1, and recites that the cationic polymer composition includes a polyacrylamide polymer.

Claim 10 is dependent on claim 1, and recites that at least one cationic polymer composition is a synthetic, water-soluble cationic polymer containing acrylamide units and cationic monomeric units.

Claim 11 is dependent on claim 1, and recites that the cationic polymer in the cationic polymer composition is added to the pulp in an amount of from about 0.0001% by weight to about 1.000% by weight, based on the dried solids weight of the pulp.

Claim 17 is dependent on claim 1, and recites that at least one cellulytic enzyme composition and at least one cationic polymer composition are added within 1 minute of each other.

Claims 19 and 20 are dependent on claims 1 and 19, respectively, and recite that at least one cellulytic enzyme composition and at least one cationic polymer composition are added prior to a blend chest and a first refiner, respectively, in a paper making process.

Claim 21 is dependent on claim 19, and further recites introducing at least one first cationic starch to the treated pulp prior to the blend chest.

Claim 22 is dependent on claim 19, and recites that at least one cationic polymer composition includes a synthetic polymer having at least one nitrogen-containing polymer.

Claim 24 is dependent on claim 1, and recites that the pulp is a virgin sulfite pulp.

With respect to the merits of the rejection, a method of making paper or paperboard by introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other to form a treated pulp, as set forth in the claimed invention is not taught or suggested by Sarkar et al. '497 and/or Sarkar et al. '914.

Sarkar et al. '497 is directed to improving freeness of paper pulp that includes adding to the pulp a cellulytic enzyme, and allowing the pulp to contact the cellulytic enzyme for at least 20 minutes. See col. 3, line 25. According to Sarkar et al. '497, at col. 3, the process requires that the pulp first be treated with an enzyme and then with a cationic polymer. Furthermore, Sarkar et al. '497, at col. 3, lines 25 and 26, indicates that the minimum treating time of the pulp with an enzyme is about 20 minutes. In fact, Sarkar et al. '497 states, at col. 3, lines 19-22, "[i]t is also important to the successful practice of the invention, that the conditions under which the treatment with the enzyme

occurs is such to provide optimum reaction time of the enzyme with the pulp." Clearly, for the invention of Sarkar et al. '497 to succeed, a reaction time of 20 minutes is necessary. Accordingly, one skilled in the art by reading Sarkar et al. '497 would conclude that a reaction time of less than 20 minutes will not make the invention "successful."

According to Sarkar et al. '497, at Table 1, the CSF (Canadian Standard Freeness) values vary depending on the enzyme treatment time. CSF value is a designated value which relates to the freeness of the pulp, the rate at which water will drain through the pulp. The drainability of the pulp is a significant for predicting the draining capability of the pulps in an aqueous suspension. A low freeness means that the paper machine will have to operate relatively slowly, a condition that is usually intolerable. Thus, the higher the CSF value, the higher the draining capability of the pulps in an aqueous suspension. Thus, Sarkar et al. '497 clearly mandates that there be a waiting time of at least 20 minutes between the introduction of the cationic polymer and after the introduction of the enzyme. At least 20 minutes is not "within 5 minutes." At least 20 minutes is at least 4 times greater in value than within 5 minutes. As such, one skilled in the art would not conclude that at least 20 minutes would render 5 minutes or less obvious.

As the Examiner admits, each Sarkar et al. reference shows a delay in the treating time with the enzyme cationic polymer. In fact, the Examiner at page 3, lines 19-21 of the final Office Action, states that according to Table 1 of Sarkar et al. '497, an increase in time between the additions further improves the CSF value. Since 20 minutes is not "within 5 minutes" and is not even close to "within 5 minutes," it is clear that Sarkar et al. does not teach or suggest the claimed invention. Furthermore, claim 17, which recites a

time of within 1 minute, is also different from the Examiner's interpretation of Sakar et al. Accordingly, it is clear that the Sarkar et al. patents do not teach or suggest the claimed invention.

With respect to the Examiner's reliance on Table 1 of Sarkar et al. '497, Table 1 does make references to 10 minutes. However, even "10 minutes" is not the same as "within 5 minutes." It is double the time. In fact, one skilled in the art by reading Table 1 would appreciate that a reduced reaction time results in an undesirable lower Canadian standard freeness (CSF) value.

According to Table 1, at col. 4, lines 39, 40, and 43 (Runs 21, 15, and 20, respectively) polymer 2 with enzyme 1 at a pH of 6, at 40°C, and at a reaction time of 10 minutes, results in a CSF value of 506.63 (see Run 21); however, the same composition at the same temperature, but at a reaction time of 35 minutes, results in a CSF value of 601.0, and at a reaction time of 85 minutes, results in a CSF value of 622.60 (see Runs 20 and 15, respectively). Higher CSF values as explained above are better. Therefore, one skilled in the art by reading each of the Sarkar et al. references, and especially in view of Table 1 of Sarkar et al. '497, would conclude that a reaction time of greater than 20 minutes is required and that a reaction time of less than 10 minutes would result in a poor reaction. As such, Sarkar et al. clearly teaches away from introducing the enzyme composition and the cationic polymer composition at less than 20 minutes of each other, and certainly based on the poor CSF results, one skilled in the art would clearly not go below 10 minutes.

With respect to the Examiner's statement that Sarkar et al. '497, at Table 1, describes CSF values of 558.84 for 35 minutes (Run 30), 439.75 for 60 minutes (Run 3),

and 645.96 for 10 minutes (Run 26), and that one skilled in the art by reading Sarkar et al. '497 would conclude that the CSF values appear to increase with shorter time durations between the introduction of the cationic polymer and the introduction of the enzyme, the Examiner's conclusion is simply incorrect. The Examiner is making an unfair comparison as explained below.

It is a well known fact that in order to determine the effect of changing a variable, such as a treatment time, all other variables must be kept constant. To determine how a treatment time of 10 minutes versus a treatment time of 35 minutes and a treatment time of 85 minutes effect the CSF value, the remaining parameters/variables, such as the composition and the environment must be kept constant in all comparative runs. Keeping the remaining parameters/variables (e.g., the type of polymer, the amount of enzyme, the pH level of the composition, and the temperature) constant while changing the treatment time ensures that parameters/variables other than the treatment time have not influenced or affected the CSF value.

Given that each of Runs 30, 3, and 26 in Table 1 of Sarkar et al. '497, include a different polymer, enzyme, pH, and temperature, it would be impossible, for one skilled in the art, to determine which of the variables, or a combination thereof, caused the change/discrepancy between the CSF value of each of Runs 30, 3, and 26.

The Board should recognize and appreciate that since the parameters of Runs 30, 3, and 26 differ from each other, the CSF value obtained from each of those Runs cannot properly be compared to one another to determine the effect of changing the treatment time. For example, the parameters of Run 30 include polymer 2, pH of 6, enzyme concentration of 0.l, and temperature of 70°C. However, the parameters of Run 3 include

polymer 1, pH of 7.07, enzyme concentration of 0.2, and temperature of 25°C. Additionally, the parameters of Run 26 include polymer 3, pH of 4.6, enzyme concentration of 0.2, and temperature of 55°C. These are drastically different parameters for each run. Therefore, one skilled in the art would not be able to determine which one of these parameters contributed to the value of the CSF in each Run. Thus, it would be unreasonable to ignore the effect of these parameters and conclude that the difference between the CSF value in each Run is exclusively related to the treatment time.

Accordingly, the Examiner's conclusion that CSF values appear to increase with shorter time duration between the introduction of the cationic polymer and the introduction of the enzyme is not supported in Sarkar et al. '497.

In contrast, since the parameters of Runs 15, 20 and 21 in Table 1 of Sarkar et al. '497, include the same polymer (2), the same enzyme concentration (0.1), the same pH level (6), and the same temperature (40°C), one skilled in the art can compare each of the CSF values of Runs 15, 20 and 21 to determine the effect of the treatment time. According to Table 1, a reaction time of 10 minutes (Run 21) results in a CSF value of 506.63. However, the same composition at the same temperature, but at a different reaction time of 35 minutes (Run 20) results in an improved CSF value of 601.0, and at a reaction time of 85 minutes (Run 15) results in yet higher CSF value of 622.60. As time increases, the properties are better. Accordingly, one skilled in the art, by reading Sarkar et al. '497, would conclude that a reaction time of greater than 20 minutes is required, and that a reaction time of less than 10 minutes would not be satisfactory. As such, Sarkar et al. '497 clearly teaches away from reacting a polymer composition with a paper making pulp for a time less than 20 minutes and certainly based on the poor results

illustrated at Table 1, one skilled in the art would clearly not be motivated to react a polymer composition with a paper making pulp for a time less than 10 minutes.

With respect to Sarkar et al. '914, this patent is very similar to Sarkar et al. '497 in that the purpose of the invention is to enhance the freeness of paper pulp. Sarkar et al. '914 further requires long delays between the introduction of the enzyme and the introduction of any cationic polymer. Therefore, for the same reasons discussed above with respect to Sarkar et al. '497, Sarkar et al. '914 does not teach or suggest the claimed invention.

With respect to claim 22 which recites that the polymeric composition includes a synthetic polymer having at least one nitrogen-containing polymer, no mention of utilizing a nitrogen-containing polymer is made in Sarkar et al. '497 and Sarkar et al. '914.

Accordingly, for the reasons set forth above, the rejection of claims 1, 3, 4, 6, 8-11, 17, 19-22, and 24 should be reversed.

b) The patentability of claim 13.

Claim 13 is dependent on claim 1, and recites that the cationic polymer in the cationic polymer composition has a weight average molecular weight of at least about 10,000 and a cationic polymer composition is pre-combined with the enzyme composition before the polymer and enzyme are added together to the pulp.

The arguments set forth above with respect to the patentability of claim 1 apply equally here, and are incorporated in their entirety by reference herein.

As noted, claim 13 specifically relates to a polymer that includes a weight average molecular weight of at least about 10,000 and the cationic polymer composition is pre-

combined with the enzyme composition.

Besides the above previously presented arguments, Sarkar et al. '497, with or without Sarkar et al. '914, does not teach or suggest pre-combining a cationic polymer and an enzyme as recited in claim 13 of the present application. Instead, col. 3 of Sarkar et al. '497 requires that the pulp first be treated with the enzyme and then with a cationic polymer. Similarly, Sarkar et al. '914, at col. 3, lines 24-28, state that its invention requires that the pulp first be treated with an enzyme at two distinct and separate locations in the paper making process, then with a cationic polymer, and finally, with an anionic polymer. Thus, Sarkar et al. '497, with or without Sarkar et al. '914, does not teach or suggest pre-combining a cationic polymer composition with an enzyme composition prior to adding the polymer and enzyme to the pulp.

Accordingly, for the reasons set forth above, the rejection of claim 13 should be reversed.

c) The patentability of claim 18.

Claim 18 is dependent on claim 1, and recites that at least one cellulytic enzyme composition and at least one cationic polymer composition are added simultaneously.

The arguments set forth above with respect to the patentability of claim 1 apply equally here, and are incorporated in their entirety by reference herein. Furthermore, Sarkar et al. '497, at col. 3, lines 17-19, states that its invention requires that the pulp first be treated with the enzyme and then with the cationic polymer. Furthermore, Sarkar et al. '914, at col. 3, lines 24-27, state that its invention requires that the pulp first be treated with an enzyme at two distinct and separate points in the paper making process, then with a cationic polymer and, finally, with an anionic polymer. Sarkar et al. '497, with or

without Sarkar et al. '914, does not teach or suggest adding at least one cellulytic enzyme composition and at least one cationic polymer composition simultaneously to the pulp.

Accordingly, for the reasons set forth above, the rejection of claim 18 should be reversed.

d) The patentability of claims 31-36, 38, and 39.

Claim 31 recites a method of making paper or paperboard by introducing a cationic polymer composition to a pulp to form treated pulp; introducing at least one cellulytic enzyme composition to said treated pulp to form an enzyme-treated pulp; adding a nitrogen-containing cationic polymer composition to the enzyme-treated pulp; and forming the pulp into paper or paperboard.

Claim 32 is dependent on claim 31, and further recites introducing a second cationic polymer composition to the enzyme-treated pulp prior to introducing the nitrogen-containing cationic polymer composition to the enzyme-treated pulp.

Claim 33 is dependent on claim 31, and recites that the cationic polymer composition includes a nitrogen-containing polymer or a starch.

Claim 34 is dependent on claim 32, and recites that the second cationic polymer composition includes a nitrogen-containing polymer or a starch.

Claim 35 is dependent on claim 31, and recites that the cellulytic enzyme composition contains from about 5% to about 20% enzyme.

Claim 36 is dependent on claim 31, and recites that the enzyme in the enzyme composition is added to the pulp in an amount of from about 0.001% to about 0.100% by weight enzyme based on the dried solids weight of the pulp.

Claim 38, is dependent on claim 31, and recites that the pulp includes a sulfite

pulp.

Claim 39 is dependent on claim 31, and recites that the cationic polymer in the cationic polymer composition is added to the pulp in an amount of from about 0.0001% by weight to about 1.000% by weight, based on the dried solids weight of the pulp.

Sarkar et al. '497 does not teach or suggest first introducing a cationic polymer composition to the pulp to form a treated pulp and then introducing at least one cellulytic enzyme to the treated pulp to form the pulp into paper, as recited in claim 31 of the present application. Claim 31 recites this order. Instead, Sarkar et al. '497, at col. 3, requires that the pulp first be treated with the enzyme, for a minimum treating time of about 20 minutes, and then with the cationic polymer. Clearly the order of adding the enzyme and the cationic polymer taught by Sarkar et al. '497 teaches away from first introducing a cationic polymer composition to the pulp, to form a treated pulp, and then adding at least one cellulytic enzyme composition to the treated pulp, as recited in claim 31 of the present application. Thus, for the reasons set forth above, Sarkar et al. '497 clearly teaches away from claim 31 and the claims dependent thereon.

Furthermore, no mention is made in Sarkar et al. '497 or Sarkar et al. '914 of using a nitrogen-containing polymer or a starch, as recited in claims 33 and 34 of the present application. Accordingly, for the reasons set forth above, the rejection of claims 31-36, 38, and 39 should be reversed.

e) The patentability of claims 41 and 42.

Claim 41 is dependent on claim 31, and recites that a cationic polymer composition is introduced at the blend chest in a paper making process and at least one cellulytic enzyme composition is introduced at the machine chest of the same paper making process and the

nitrogen-containing cationic polymer composition is added at about the whitewater silo in the same paper making process.

Claim 42 is dependent on claim 41, and recites that the optional cationic polymer is introduced at the stuff box which is located between the machine chest and the whitewater silo.

The arguments set forth above with respect to the patentability of claim 31 apply equally here, and are incorporated in their entirety by reference herein. As stated earlier, the invention of Sarkar et al. '497 requires that the pulp first be treated with the enzyme and then with a cationic polymer. Additionally, Sarkar et al. '497, at col. 3, lines 48-51, states that a typical enzyme addition point in the paper making system would be the machine chest. Given that, according to the figures of the present invention, the machine chest is located after the blend chest, and Sarkar et al. '497, at col. 3, lines 15-19, specifically states that the pulp is first treated with the enzyme and then with a cationic polymer, Sarkar et al. '497 teaches away from introducing the cationic polymer composition in the blend chest.

Sarkar et al. '914 describes the use of multiple feed points for the polymer and the enzyme. Sarkar et al. '914 also requires that the pulp first be treated with an enzyme and then with a cationic polymer (see col. 3, lines 24-28). Given that the blend chest, wherein the polymer composition as recited in claim 31 is introduced, is located prior to the machine chest, and Sarkar et al. '497 and Sarkar et al. '914 require the pulp to first be treated with the enzyme at the machine chest and then with the cationic polymer, Sarkar et al. '497 and '914 teach away from claim 41 of the present application, which introduces the polymer in a blend chest located prior to the machine chest. Furthermore, none of the references teach or suggest a nitrogen-containing cationic polymer composition that is added at about the

whitewater silo in the paper making process. Accordingly, for the reasons set forth above, the rejection of claims 41 and 42 should be reversed.

B. The Examiner's rejection of claims 2, 7, 12, and 23 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of EP 433 258.

1. The Examiner's Rejection

At page 4 of the final Office Action, the Examiner rejects claims 2, 7, 12, and 23 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of EP 433 258. The Examiner asserts that EP 433 258 teaches that adding cationic starch to paper pulp during enzymatic treatment increases the strength of the paper. Therefore, according to the Examiner, it would have been obvious to add the cationic starch to the pulp of Sarkar et al. '497 to increase the paper strength as taught by EP 433 258. The Examiner also asserts that it would have been obvious to add the starch at various addition points in the same manner as the cationic starch and the enzyme in Sarkar et al. '914.

The Examiner also asserts that the appellants' arguments with respect to the addition of starch is not convincing because the appellants failed to show the criticality of adding a starch at a certain time. The Examiner states that it is known that starch increases the strength of paper. Furthermore, the Examiner states that the ingredients of the reference would have been expected to form the same final mixture as the claimed invention, irrespective as to the order of addition. Thus, the Examiner states that it is proper to take into account not only the specific teachings of the reference, but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. For the following

reasons, the Examiner's rejection should be reversed.

2. The Appellants' Reply to the Examiner's Rejection of claims 2, 7, 12, and 23 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of EP 433 258.

a) The patentability of claims 2, 7, 12, and 23.

Claim 2 is dependent on claim 1, and further recites introducing at least one first cationic starch to the treated pulp.

Claim 7 is dependent on claim 2, and recites a second cationic starch, which is the same or different from the first cationic starch, and is introduced to the treated pulp before forming the treated pulp into paper or paperboard.

Claim 12 is dependent on claim 2, and recites that at least one cationic starch is added to the treated pulp in an amount of from about 5 to about 25 pounds per ton based on the dried solids weight of the pulp.

Claim 23 is dependent on claim 21, and further recites introducing at least a second cationic starch to the treated pulp and wherein the first and second cationic starches are the same or different.

With respect to the merits of the rejection, a method of making paper or paperboard by introducing at least one first cationic starch to the treated pulp is not taught by Sarkar et al. '497, with or without Sarkar et al. '914, and further in view of EP 433 258.

The arguments set forth above with respect to the patentability of claim 1 apply equally here, and are incorporated in their entirety by reference herein. As previously stated, Sarkar et al. '497, with or without Sarkar et al. '914, does not teach or suggest introducing at least one cellulytic enzyme and at least one cationic polymer composition to a paper making

pulp within 5 minutes of each other.

In addition, the Examiner has not explained how one skilled in the art could easily adapt the particular teachings set forth in EP 433 258 into either one of the Sarkar et al. patents. Sarkar et al., in each patent, clearly requires a long delay time between the introduction of enzyme and the cationic polymer. Thus, any introduction of a cationic starch as shown in EP 433 258 would require even a longer delay if used in Sarkar et al.

According to Sarkar et al. '497, the order of adding the ingredients is extremely important. According to Sarkar et al. '497, the cationic polymer prevents the enzyme from properly reacting with the pulp. Thus, because of the order in which the ingredients are added in the reference, one skilled in the art would not expect the ingredients of the reference to form the final mixture of the claimed invention.

With respect to the Examiner's argument that it is obvious to add starch at various addition points, the Examiner provides no support for this conclusion. In addition, EP 433 258 clearly indicates that the starch is added prior to the enzyme. This is the complete opposite to the teachings of the Sarkar et al. patents and thus would not make sense if the teaching of EP 433 258 were applied to Sarkar et al. Accordingly, the combination of EP 433 258 with Sarkar et al. '497, with or without Sarkar et al. '914, is not possible.

Moreover, the Examiner's "inference" standard is not the standard to use for determining patentability under 35 U.S.C. §103.

Accordingly, for the reasons set forth above, the rejection of claims 2, 7, 12, and 23 should be reversed.

C. The Examiner's rejection of claims 5 and 37 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further

in view of WO 99/43780.

1. The Examiner's Rejection

At page 4 of the final Office Action, the Examiner rejects claims 5 and 37 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of WO 99/43780. The Examiner asserts that WO 99/43780 describes stabilizing the enzymes during pulp treatment by using the enzyme in combination with a polyamide oligomer. Therefore, the Examiner asserts that it would have been obvious to add the polyamide oligomer of WO 99/43780 to stabilize the enzyme of Sarkar et al. '497. For the following reasons, the Examiner's rejection of claims 5 and 37 should be reversed.

2. The Appellants' Reply to the Examiner's rejection of claims 5 and 37 under 35 U.S.C. §103(a) as being unpatentable over Sarkar et al. '497 with or without Sarkar et al. '914, and further in view of WO 99/43780.

a) The patentability of claim 5.

Claim 5 is dependent on claim 1, and recites that the cellulytic enzyme composition includes at least one polyamide oligomer and at least one cellulytic enzyme.

The arguments set forth above with respect to the patentability of claim 1 apply equally here, and are incorporated in their entirety by reference herein. As previously stated, neither Sarkar et al. '497, Sarkar et al. '914, nor a combination thereof teaches or suggests introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other to make paper or paperboard.

WO 99/43780 relates to improving the shelf life stability of enzymes by using

polyamide oligomers. WO 99/43780 does not cure any of the deficiencies of Sarkar et al. '497 or Sarkar et al. '914. Accordingly, for the reasons set forth above, the rejection of claim 5 should be reversed.

b) The patentability of claim 37.

Claim 37 is dependent on claim 31, and recites that the enzyme composition includes at least one polyamide oligomer and at least one cellulytic enzyme.

The arguments set forth above with respect to the patentability of claim 31 apply equally here, and are incorporated in their entirety by reference herein. As previously stated, Sarkar et al. '497 and Sarkar et al. '914, do not teach or suggest first introducing a cationic polymer composition to the pulp and then introducing at least one cellulytic enzyme to form the paper pulp into paper. Additionally, Sarkar et al. '497 and Sarkar et al. '914 do not teach or suggest adding a nitrogen-containing cationic polymer composition to the enzyme-treated pulp.

As stated above, WO 99/43780 relates to improving the shelf life stability of enzymes by using polyamide oligomers. However, the reference does not cure any of the deficiencies of Sarkar et al. '497 or Sarkar et al. '914. Accordingly, for the reasons set forth above, the rejection of claim 37 should be reversed.

IX. CONCLUSION

For at least the reasons discussed above, it is respectfully submitted that the Examiner's rejection of all the pending claims is in error and should be reversed.

If there is any fee due in connection with the filing of this Brief on Appeal, please

charge the fee to our Deposit Account No. 50-0925.

Respectfully submitted,

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APPENDIX

1. A method of making paper or paperboard comprising:

a) introducing at least one cellulytic enzyme composition and at least one cationic polymer composition to a paper making pulp within 5 minutes of each other to form a treated pulp; and

b) forming the treated pulp into paper or paperboard.

2. The method of claim 1, further comprising introducing at least one first cationic starch to the treated pulp.

3. The method of claim 1, wherein said cellulytic enzyme composition contains from about 5 % to about 20 % by weight enzyme.

4. The method of claim 1, wherein said cellulytic enzyme composition is added to said pulp in an amount of from about 0.100% to about 0.001% by weight enzyme based on the dry weight of the pulp.

5. The method of claim 1, wherein said cellulytic enzyme composition comprises at least one polyamide oligomer and at least one cellulytic enzyme.

6. The method of claim 1, wherein said pulp comprises a sulphite pulp.

7. The method of claim 2, wherein a second cationic starch, which is the same or different from the first cationic starch, is introduced to the treated pulp before step b).

8. The method of claim 1, wherein said at least one cationic polymer composition comprises a synthetic cationic polymer.

9. The method of claim 1, wherein said at least one cationic polymer composition comprises a polyacrylamide polymer.

10. The method of claim 1, wherein said at least one cationic polymer composition is a synthetic, water-soluble cationic polymer containing acrylamide units and cationic monomeric units.

11. The method of claim 1, wherein cationic polymer in said cationic polymer composition is added to said pulp in an amount of from about 0.0001% by weight to about 1.000% by weight, based on the dried solids weight of said pulp.

12. The method of claim 2, wherein said at least one cationic starch is added to said treated pulp in an amount of from about 5 to about 25 pounds per ton based on the dried solids weight of the pulp.

13. The method of claim 1, wherein cationic polymer in said cationic polymer composition has a weight average molecular weight of at least about 10,000 and said cationic polymer composition is pre-combined with the enzyme composition before the polymer and enzyme are added together to the pulp.

17. The method of claim 1, wherein said at least one cellulytic enzyme composition and at least one cationic polymer composition are added within 1 minute of each other.

18. The method of claim 1, wherein said at least one cellulytic enzyme composition and at least one cationic polymer composition are added simultaneously.

19. The method of claim 1, wherein said at least one cellulytic enzyme composition and at least one cationic polymer composition are added prior to a blend chest in a paper making process.

20. The method of claim 19, wherein said at least one cellulytic enzyme composition and at least one cationic polymer composition are added prior to a first refiner which is located before the blend chest.

21. The method of claim 19, further comprising introducing at least one first cationic starch to the treated pulp prior to the blend chest.

22. The method of claim 19, wherein said at least one cationic polymer composition comprises a synthetic polymer having at least one nitrogen-containing polymer.

23. The method of claim 21, further comprising introducing at least a second cationic starch to the treated pulp and wherein said first and second cationic starches are the same or different.

24. The method of claim 1, wherein said pulp is a virgin sulfite pulp.

31. A method of making paper or paperboard comprising:

a) introducing a cationic polymer composition to a pulp to form treated pulp;

b) introducing at least one cellulytic enzyme composition to said treated pulp to form an enzyme-treated pulp;

c) adding a nitrogen-containing cationic polymer composition to the enzyme-treated pulp; and

d) forming the pulp into paper or paperboard.

32. The method of claim 31, further comprising introducing a second cationic polymer composition to the enzyme-treated pulp prior to introducing the nitrogen-containing cationic polymer composition to the enzyme-treated pulp.

33. The method of clam 31, wherein said cationic polymer composition comprises a nitrogen-containing polymer or a starch.

34. The method of claim 32, wherein said second cationic polymer composition comprises a nitrogen-containing polymer or a starch.

35. The method of claim 31, wherein said cellulytic enzyme composition contains from about 5% to about 20% enzyme.

36. The method of claim 31, wherein said enzyme in said enzyme composition is added to said pulp in an amount of from about 0.001% to about 0.100% by weight enzyme based on the dried solids weight of the pulp.

37. The method of claim 31, wherein said enzyme composition comprises at least one polyamide oligomer and at least one cellulytic enzyme.

38. The method of claim 31, wherein said pulp comprises a sulfite pulp.

39. The method of claim 31, wherein said cationic polymer in said cationic polymer composition is added to said pulp in an amount of from about 0.0001% by weight to about 1.000% by weight, based on the dried solids weight of said pulp.

41. The method of claim 31, wherein said cationic polymer composition is introduced at the blend chest in a paper making process and said at least one cellulytic enzyme composition is introduced at the machine chest of the same paper making process and said nitrogen-containing cationic polymer composition is added at about the whitewater silo in the same paper making process.

42. The method of claim 41, wherein said optional cationic polymer is introduced at the stuff box which is located between said machine chest and said whitewater silo.